

# ATLAS SCT Barrel Module Assembly Process

## USA Cluster

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### Revision History:

11-Feb-02 V1.0: original version  
28-Feb-02 V2.0: revised, added metrology, glue dispense  
12-Jul-02 V3.0: revised, subtracted glue dispense (now separate doc.)  
17-Jul-02 V4.0: General editing, moved metrology and I-V scan to separate documents.

### **1.0 Detector selection and inspection**

- 1.1 Select wafers from database or provided list
- 1.2 Inspect visually under the microscope for scratches and other defects.
- 1.3 Confirm that corner fiducials are not defective
- 1.4 Check wafers for correct size - that the saw cut street isn't excessively wide. This will cause detectors to collide during alignment. (Note: this step applied to dummy and glass wafers).

### **2.0 Setting of proper dimensions file (DIMS file)**

- 2.1 The proper dimensions for this module should be in the file:

ATLAS SCT: LabVIEW 5.1:V5\_LV51:Assembly-RAL:Data:BarrelFront.dim or  
ATLAS SCT: LabVIEW 5.1:V5\_LV51:Assembly-RAL:Data:BarrelBack.dim

as appropriate. After the addition 6 assembly kits are commissioned we will have additional dim files for them. Use the appropriate file for the fixture kit in use.

### **3.0 Setting of lights and video**

- 3.1 The power supply for the assembly optics illuminator should be ON and set to 8.5 V. This supply should never be switched OFF.
- 3.2 The SONY video monitor should be BRIGHT full scale.
- 3.4 The JVC camera power supply should be on.

### **4.0 Load and execute Build.vi**

- 4.1 Run LabVIEW 5.1
- 4.2 Close the blank windows, which appear at initialization.

4.3 Open Build.vi either from File->Recently Opened Files or from

ATLAS SCT: LabVIEW 5.1:V5\_LV51:Assembly-RAL:Progs:Assemble.llb - Build.vi

4.4 Click the RUN arrow

4.5 Select Module type: **Barrel**

4.6 Select Module type: **Front** or **Back** as appropriate.

4.7 Click **Go** on **Start** button.

4.8 The following frames will open automatically:

Steps.vi

Log-display.vi

Image

4.9 User input will be via the Steps.vi frame from now on.

## **5.0 Loading of wafers**

5.1 Move the wafer stages to the load position by using the Steps.vi window.

5.2 Set the wafer alignment stops on the stages by turning the knurled machine screws clockwise till seated finger tight (approx. 2 turns)

5.3 Move wafer to assembly stage via carrying tray.

5.4 Pick up wafer with vacuum pen and place on stage with edges near the alignment stops. Ensure correct orientation.

5.5 Seat wafer against stops with light force at approximately a 45-degree vector between stops. Wafer should be contacting all 3 stops.

5.6 Apply vacuum to wafer while maintaining seating force.

## **6.0 Running build Steps.vi**

If FRONT go to step 7.0

If BACK go to step 12.0

## **7.0 Baseboard preparation and loading baseboard into assembly window frame**

7.1 Inspect washers and holes in b/b for damage or debris. If dirty clean holes with air spray or small pick tool.

7.2 Inspect baseboard for cracks or defects in TPG and for glue deposits on ceramic surfaces.

7.3 Measure TPG thickness with digital calipers. Determine to nearest 10 microns (0.45 mm, 0.46 mm etc). Measure in a few spots and take rough average.

7.4 Run the Baseboard Shim Calculator spreadsheet and determine required shim thickness.

- 7.5 Record baseboard number, thickness, and shim choice in traveler.
- 7.6 Clean off b/b support plate with air spray and mount b/b on plate, secure with vacuum.
- 7.7 Place shims on B side of window frame, insert b/b support plate and secure with three screws using torque wrenches in the 1,2,3... order.

**8.0 Glue preparation and dispensing. See document C:\Documents and Settings\Administrator\Desktop\SCT Documentation\ATLAS SCT Barrel Module Adhesive Procedure.doc**

Use Program #2

**9.0 Pickup wafers**

- 9.1 Pick up wafers from assembly machine using vacuum transfer plate as follows.
- 9.2 For front, use plate "A". For back, use plate "B".
- 9.3 Raise plate stop on linear bearing tower to highest position by turning brass thumbwheel clockwise.
- 9.4 Back off detector alignment stops to full travel by turning black thumbscrews.
- 9.5 Clean off top of detectors with clean air source.
- 9.6 Place new sheet of wafer paper on detector pair. **We are now using larger BLUE wafer paper.**
- 9.7 Carefully slide transfer plate guide posts into linear bearings, lower plate until contact with plate stop.
- 9.8 Lower plate stop till transfer plate contacts detector pair under paper.
- 9.9 Gently place weight on top of transfer plate.
- 9.10 Remove vacuum from stages by closing valves.
- 9.11 Apply vacuum to transfer plate by opening appropriate valve.

**10.0 Loading wafers into window frame fixture**

- 10.1 Select shims of appropriate thickness to set the clearance between detector and baseboard. This controls glue line thickness. For the FRONT or A side we do not use any shims. For the B or backside, determine shim using Baseboard Shim Calculator spreadsheet.
- 10.2 Center shims on machined surface of compression posts. Make sure threaded holes are visible.
- 10.3 Lower transfer plate on to window frame fixture, engaging linear bearings and guideposts.
- 10.4 Seat transfer plate gently against shims, inset and torque screws to specification following 1,2,3...pattern.
- 10.5 Allow ass'y to cure for 24 hours at 20C, 50%RH before movement.

**11.0 Remove baseboard support plate from window frame fixture**

- 11.1 Close vacuum valve to baseboard support plate.
- 11.2 Remove Allen head retaining screws (3)
- 11.3 Slide baseboard support plate up until disengaged from linear bearings.

## **12.0 Glue dispense on back – see step 8.0**

Run program #1.

## **13.0 Pickup wafers**

- 13.1 Pick up wafers from assembly machine using vacuum transfer plate as follows.
- 13.2 For back, use plate “B”.
- 13.3 Raise plate stop on linear bearing tower to highest position by turning brass thumbwheel clockwise.
- 13.4 Clean off top of detectors with clean air source.
- 13.5 Place new sheet of wafer paper on detector pair.
- 13.6 Carefully slide transfer plate guide posts into linear bearings, lower plate until contact with plate stop.
- 13.7 Lower plate stop till transfer plate contacts detector pair under paper.
- 13.8 Gently place weight on top of transfer plate.
- 13.9 Remove vacuum from stages by closing valves.
- 13.10 Apply vacuum to transfer plate by opening appropriate valve.

## **14.0 Loading wafers into window frame fixture**

- 14.1 Select shims of appropriate thickness to set the clearance between detector and baseboard. See results of Shim Calculator. This controls glue line thickness.
- 14.2 Center shims on machined surface of compression posts. Make sure threaded holes are visible.
- 14.3 Lower transfer plate on to window frame fixture, engaging linear bearings and guideposts.
- 14.4 Seat transfer plate gently against shims, inset and torque screws to specification following pattern.
- 14.5 Allow ass’y to cure for 24 hours at 20C, 50%RH before movement.

## **15. Release from window frame fixture**

It is important to remove the module while it is still held by vacuum to the B plate.

- 15.1 Unscrew 3 retaining bolts from fixture on the A transfer plate only.
- 15.2 Remove vacuum from transfer plate A, slide transfer plate up and off.
- 15.3 Turn Window Frame over. Remove 3 retaining bolts from the B fixture.
- 15.4 Lift B fixture up and out with module still attached.

15.5 Place B fixture with module facing up on the table. When ready, release B vacuum and lift module with module handling tool.

## **16. Mount module on metrology frame**

For metrology steps refer to the document C:\Documents and Settings\Administrator\Desktop\SCT Documentation\US\_Mechanical\_Survey\_V2.doc

Basic Smart Scope setup is as follows:

16.1 Clear the Smart Scope glasswork area of all parts and tooling unrelated to this measurement.

16.2 Switch on power to the table drive controller - look for green light on the IN/MM switch to ensure power is on.

16.3 Switch on power to the computer and monitor.

16.4 Open the software programs called MeasureMind.

16.5 Retract lens to highest position by rotating joystick knob clockwise.

16.6 Press START/STOP button on right side of table drive controller.

16.7 Click OK on "stage seek home" dialog box.